



Atty. Docket No. 028987.53044US

## **FRICITION CLUTCH FOR A DRIVE ASSEMBLY OF A MOTOR VEHICLE**

### **BACKGROUND AND SUMMARY OF THE INVENTION**

[0001] This application claims the priority of German Patent Application No. 10308771.0, filed February 28, 2003, the disclosure of which is expressly incorporated by reference herein.

[0002] The invention relates to a friction clutch for a drive assembly of a motor vehicle which operates between an internal-combustion engine and a transmission.

[0003] A known friction clutch of the initially mentioned construction - U.S. Patent Document US 5,183,141 - is equipped with a clutch release device arranged inside a housing surrounding the friction clutch. The clutch release device has a release bearing and a hydraulic operating device which comprises an outer cylinder housing fastened to the housing and an inner operating piston, the operating piston being axially movably arranged in the cylinder housing and cooperating with a release bearing or a diaphragm spring of the clutch. A comparable construction is known from German Patent Document DE 694 22 276 T2. However, in this case, an inner cylinder housing of the hydraulic operating device is fixedly connected with a wall of the housing and a displaceable operating piston surrounds these cylinder housings.

[0004] It is an object of the invention to equip a friction clutch provided between an internal-combustion engine and a transmission with a clutch release device which accommodates a hydraulic operating mechanism appropriately with respect to its function and can be installed in a simple manner in the area between the internal-combustion engine and the transmission.

[0005] According to the invention, this object is achieved by providing a friction clutch for a drive assembly of a motor vehicle which operates between an internal-combustion engine and a transmission and comprises a clutch release device, the clutch release device being arranged inside a transmission/clutch housing having a clutch release bearing and a hydraulic operating device with a cylinder housing and an operating piston operating in the latter, wherein the cylinder housing of the hydraulic operating device is mounted on a bearing structure arranged in use adjacent to the internal-combustion engine and the friction clutch, which bearing structure is constructed independently of the transmission/clutch housing.

[0006] Important advantages achieved by means of certain preferred embodiments of the invention are that the bearing structure has a stiff construction and securely accommodates the clutch release bearing and the cylinder housing. In this case, since the bearing structure is constructed independently of the transmission housing, it contributes to a considerable extent to the free design of the friction clutch. A holding of the bearing structure which is appropriate for its function is achieved by fastening it to the front end of the internal-combustion engine. As a result of the bearing plate and the fastening struts, the bearing structure can be optimized in a simple manner with respect to the weight, stability and space requirements. According to certain embodiments these advantages are also promoted by the fact that the bearing plate has approximately the shape of an equilateral triangle on whose vertices the fastening struts are mounted. Finally, according to certain preferred embodiments the fact that the fastening struts

and the cylinder housing are made of one piece with the bearing plate contributes to the constructional simplification.

[0007] Other objects, advantages and novel features of the present invention will become apparent from the following detailed description of the invention when considered in conjunction with the accompanying drawings.

### **BRIEF DESCRIPTION OF THE DRAWINGS**

[0008] Figure 1 is a longitudinal sectional view of a friction clutch constructed according to a preferred embodiment of the invention shown interposed between a vehicle engine and transmission;

[0009] Figure 2 is an enlarged sectional view taken along Line II-II of Figure 1;

[0010] Figure 3 is a sectional view taken along line III-III of Figure 2; and

[0011] Figure 4 is a perspective view of the inside of the housing for the friction clutch of Figure 1.

### **DETAILED DESCRIPTION OF THE DRAWINGS**

[0012] A friction clutch 1 is a component of a drive assembly which can be installed into a motor vehicle and operates between an internal-combustion engine 2 and a transmission 3. A crankshaft 4 of the internal-combustion engine 2 is schematically illustrated. Two shafts 5 and 6, which carry gear wheels 5 and 6 and which extend transversely to a longitudinal direction A-A of the vehicle - Figure 1 -, of the transmission 3 are also shown schematically. Referring to Figure

3, a clutch release device 10, which has a hydraulic operating device 11, interacts with a diaphragm spring 7 of the friction clutch 1 having several clutch disks 8 and 9. The clutch release device 10 comprising a release bearing 12 is arranged with an operating device 11 inside a transmission and clutch housing 13, the operating device 11 being equipped with a cylinder housing 14 in which an axially movable operating piston 15 is operative.

**[0013]** The cylinder housing 14 of the hydraulic operating device 11 is connected with a bearing structure 16, which is arranged adjacent to the internal-combustion engine 2 and the friction clutch 1, independently of the housing 13 surrounding the latter. The bearing structure 16 is fastened to a face 17 or to a wall 18 of the internal-combustion engine 2 and has a bearing plate 19 arranged at a distance  $A_s$  from the face 17 or the wall 18 and the friction clutch 1. The cylinder housing 14 and the fastening struts 20, 21 and 22 are connected with the bearing plate 19. The fastening struts 20, 21 and 22, which extend away from the bearing plate 10 at approximately a right angle, reach around an outside diameter  $A_d$  of the friction clutch 1, are supported on the wall 18, and are held in position on the wall 18 of the internal-combustion engine 2 by means of screws 23.

**[0014]** According to Figure 2, the bearing plate 19 has approximately the shape of an equilateral triangle with sides 24, 25 and 26 on whose vertexes 27, 28 and 29 the fastening struts 20, 21 and 22 are mounted. In this case, the fastening struts 20, 21 and 22, which surround the friction clutch 1, are made of one piece with the bearing plate 19; this analogously applies to the cylinder

housing 14. The bearing plate 19 designed in such a manner is constructed as a cast part of a light-metal or iron-metal type.

**[0015]** According to Figure 4, each fastening strut, such as 21, has a strut eye 30 with a circular-cylindrical cross-section. Tangentially relatively short stiffening flanges 31 and 32, which lead in the direction of the sides 21 and 22, extend away from this strut eye 30. Additionally, the fastening struts 20, 21 and 22 or the strut eyes 30 can be supported by means of web-type attachment struts which merge into reinforcing ribs 34. On the whole, an interior side 35 of the bearing plate 19 is equipped with a plurality of different ribs which provide the bearing plate 19 with a defined stability and holds the cylinder housing 14 corresponding to its function on the latter. Finally, connections 36 and 37 and lines 38 and 39 for the hydraulic operating device 11 are integrated in the bearing plate 19.

**[0016]** The foregoing disclosure has been set forth merely to illustrate the invention and is not intended to be limiting. Since modifications of the disclosed embodiments incorporating the spirit and substance of the invention may occur to persons skilled in the art, the invention should be construed to include everything within the scope of the appended claims and equivalents thereof.